If h is the height of cone in *inches,* and n is the speed of revolution per *minute,* then $h = \frac{c^* "00}{n^*}$, i.e. the height of cone is inversely proportional to the square of the speed.

For a change of speed from 65 to 75 r.p.m., the alteration in height of cone is ^ = 2*1 in., whereas for a speed change from 100 to no r.p.m., the alteration is only A_2 = 0-6 in. This shows that such an arrangement is valueless for governing at high speeds.

Sensitiveness, Power, and Stability.—The meaning of these terms must be defined. Sensitiveness is the ratio of the total variation of speed to the mean speed ~ -. Any governor may be made as sensitive as we please by choosing its range of speed variation sufficiently small. The range of movement would then be small also, and would have to be multiplied up by levers or their equivalent in order to obtain the necessary range of movement in the gear controlling the admission of steam, with the result that the effort available would be barely sufficient to overcome friction alone. In comparing two governors it is necessary, therefore, to know not only the speed sensitiveness or variation, but also the amount of work available for external use stored in moving from the position of lowest speed to that of highest speed. In gravity-controlled governors the amount of stored work is obviously the product of the weight of the balls and the vertical distance through which they move with regard to the earth, and this is not necessarily the same as the change in H. When the arms are pivoted on the axis, this vertical distance is the same as the variation of H. In case *(b)* it is less, as the point O descends as the balls rise. In case *(c)* it is more, as the point O rises with the balls, but not at the same rate, and for this reason the cross-armed governor is a little more powerful than either of the other types.

The plain Watt governor could be made both as sensitive and as powerful as we please by making the arms very long, and using the lower range only of the movement of the balls. Thus, a governor running at a lower speed of 20 r.p.m. and an upper speed of 20-6 r.p.m., giving a speed variation of

3 per cent reckoned on the lower speed, would require heights of cone of 88 in. and 83 in. at the two extreme positions, respectively. Very heavy balls could be used, and the governor would be sensitive, powerful, and stable, but also impracticably cumbrous.

It has been shown that for all forms of the pendulum governor there is a definite height of cone and position of the balls for each speed. It is therefore impossible for the mechanism to alter its position without a change in the speed. This quality is called " stability ", and is necessary for good governing, entailing the condition that some variation in speed is unavoidable.

In the description of high-speed engine governors the quality of isochronism is referred to, and it is shown to be obtainable with certain arrangements of weights and springs, but quite useless. This quality may be obtained in the case of gravity-controlled governors in various ways, for instance, by causing the balls to move in a parabolic path co-axial with